INEEL/EXT-03-00304
Revision 3

Project No. **23095**

Field Sampling Plan for the TSF-26, PM-2A Tank Contents at Waste Area Group 1, Operable Unit 1-10

September 2003

Idaho National Engineering and Environmental Laboratory
Bechtel BWXT Idaho, LLC

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September 2003

Idaho National Engineering and Environmental Laboratory
Idaho Completion Project
Idaho Falls, Idaho 83415

Prepared for the
U.S. Department of Energy
Assistant Secretary for Environmental Management
Under DOE Idaho Operations Office
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Approved by

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ABSTRACT

This characterization plan establishes the procedures and requirements that will be used to perform field sampling and analysis, as well as minimize health and safety risks to persons working at the Test Area North Technical Support Facility-26 PM-2A tanks (V-13 and V-14). It contains information about the characterization activity, analytical and quality assurance/quality control requirements, and the specific actions and equipment that will be used to protect persons working at the task site. Test Area North is located on the north end of the Idaho National Engineering and Environmental Laboratory.

FOREWORD

This document has been prepared in accordance with Template-104, “Model for Preparation of Characterization Plans”; Management Control Procedure-9439, “Preparation for Environmental Sampling Activities at the INEEL”; and Management Control Procedure-3562, “Hazard Identification, Analysis, and Control of Operational Activities.” This document meets the intent of a “characterization plan,” as defined in Template-104.

For PM-2A tank sampling activities, Waste Generator Services sampling work is covered under a Standard-101, “Integrated Work Control Process,” work package. Health and safety associated with sampling activities are covered under the work package generated by the facility. Project personnel have completed the hazards screening checklist to ensure that all the hazards associated with sampling have been adequately addressed in the work package. No separate job safety analysis will be generated. The work package number is 69304; the sample plan author will review the work package. For this project, there will be three work control documents: (1) this plan, (2) the project Health and Safety Plan, and (3) the work package.

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ACRONYMS

CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFR	Code of Federal Regulations
CLP	Contract Laboratory Program
COC	chain of custody
DOE	U.S. Department of Energy
DOE-ID	U.S. Department of Energy Idaho Operations Office
DOT	U.S. Department of Transportation
DQO	data quality objective
EPA	U.S. Environmental Protection Agency
ER	environmental restoration
FTL	field team leader
HASP	Health and Safety Plan
ICDF	INEEL CERCLA Disposal Facility
INEEL	Idaho National Engineering and Environmental Laboratory
JSA	job safety analysis
JSS	job site supervisor
LDR	land disposal restriction
MCP	management control procedure
ND	no detect
NV	no value
OU	operable unit
PCB	polychlorinated biphenyl
PLN	plan
PPE	personal protective equipment
P&T	packaging and transportation

RCRA	Resource Conservation and Recovery Act
SAM	Sample and Analysis Management
SOW	Statement of Work
SVOC	semivolatile organic compound
TAL	target analyte list
TAN	Test Area North
TBD	to be determined
TCE	trichloroethene
TCLP	toxicity characteristic leaching procedure
TOS	task order statement of work
TPR	technical procedure
TSF	Technical Support Facility
UCL	upper confidence limit
VOC	volatile organic compound
WGS	Waste Generator Services
WMG	wide-mouth glass

Field Sampling Plan for the TSF-26, PM-2A Tank Contents at Waste Area Group 1, Operable Unit 1-10

1. INTRODUCTION

This characterization plan was prepared for the Test Area North (TAN) Technical Support Facility (TSF) -26 PM-2A tanks (V-13 and V-14). Tanks V-13 and V-14 were installed in the mid-1950s to store radioactive liquid waste concentrated by the TAN-616 and PM-2A evaporators. In 1975, they were removed from service. Before evaporation, the raw liquid was stored in Tanks V-1, V-2, and V-3. From 1972 (when the TAN-616 evaporator was removed from service) until 1975, Tanks V-13 and V-14 received the raw liquid waste directly from Tanks V-1 and V-3, plus evaporator bottoms from the PM-2A evaporator. (Tank V-2 was removed from service in 1968.) Approximately 10,000 lb of diatomaceous earth was deposited into Tanks V-13 and V-14 to absorb the remaining liquid. Historical information on the evaporators is provided in the *Data Quality Objectives Summary Report for the PM-2A Tanks (TSF-26)* (Reese and Rodriguez 2000) and the *Final Report–Decontamination and Decommissioning of TAN Radioactive Liquid Waste Evaporator System (PM-2A)* (Smith 1983).

The waste remaining in the tanks is Resource Conservation and Recovery Act (RCRA) FOOl-listed hazardous waste and contains radionuclides, polychlorinated biphenyls (PCBs), and inorganic substances, including heavy metals. The RCRA hazardous organic compounds were listed as nondetectable in previous analytical results. However, these results are not definitive, as the detection levels exceeded concentrations corresponding to characteristic levels for hazardous waste and the levels associated with RCRA land disposal restrictions (LDRs). The presence of organic compounds is anticipated, but in concentrations below regulatory levels (see the *Conceptual Design Study Report for TSF-26 PM-2A Tanks for Test Area North Operable Unit 1-10* [McDannel 2003]).

This plan identifies the activities for the characterization project. The health and safety requirements to perform sampling will be documented in the facility-generated work package in addition to the project Health and Safety Plan (HASP) (INEEL 2003a). This plan was prepared in accordance with the requirements outlined in Management Control Procedure (MCP) -9439, "Preparation for Environmental Sampling Activities at the INEEL"; MCP-3562, "Hazard Identification, Analysis, and Control of Operational Activities"; and Template (TEM) -104, "Model for Preparation of Characterization Plans."

1.1 Project Objectives

This activity's objectives are to provide representative radiological and RCRA characterization of the tank contents for hazardous contaminants identified by the project. This document is implemented in accordance with the Waste Generator Services (WGS) Quality Assurance Project Plan (Plan [PLN] -524, "Quality Assurance Project Plan, Waste Generator Services Program Support Sampling and Analyses").

1.2 Site Description

The Idaho National Engineering and Environmental Laboratory (INEEL) encompasses 2,305 km^2 (890 mi^2) and is located approximately 55 km (34 mi) west of Idaho Falls, Idaho (see Figure 1-1). In 1949, the United States Atomic Energy Commission (now the U.S. Department of Energy [DOE]) established the Nuclear Reactor Testing Station (now the INEEL) as a site for building and testing nuclear facilities. At present, the INEEL supports the engineering and operations efforts of DOE and other federal agencies in areas of nuclear safety research, reactor development, reactor operations and training, nuclear defense materials production, waste management and technology development, and energy technology and conservation programs.

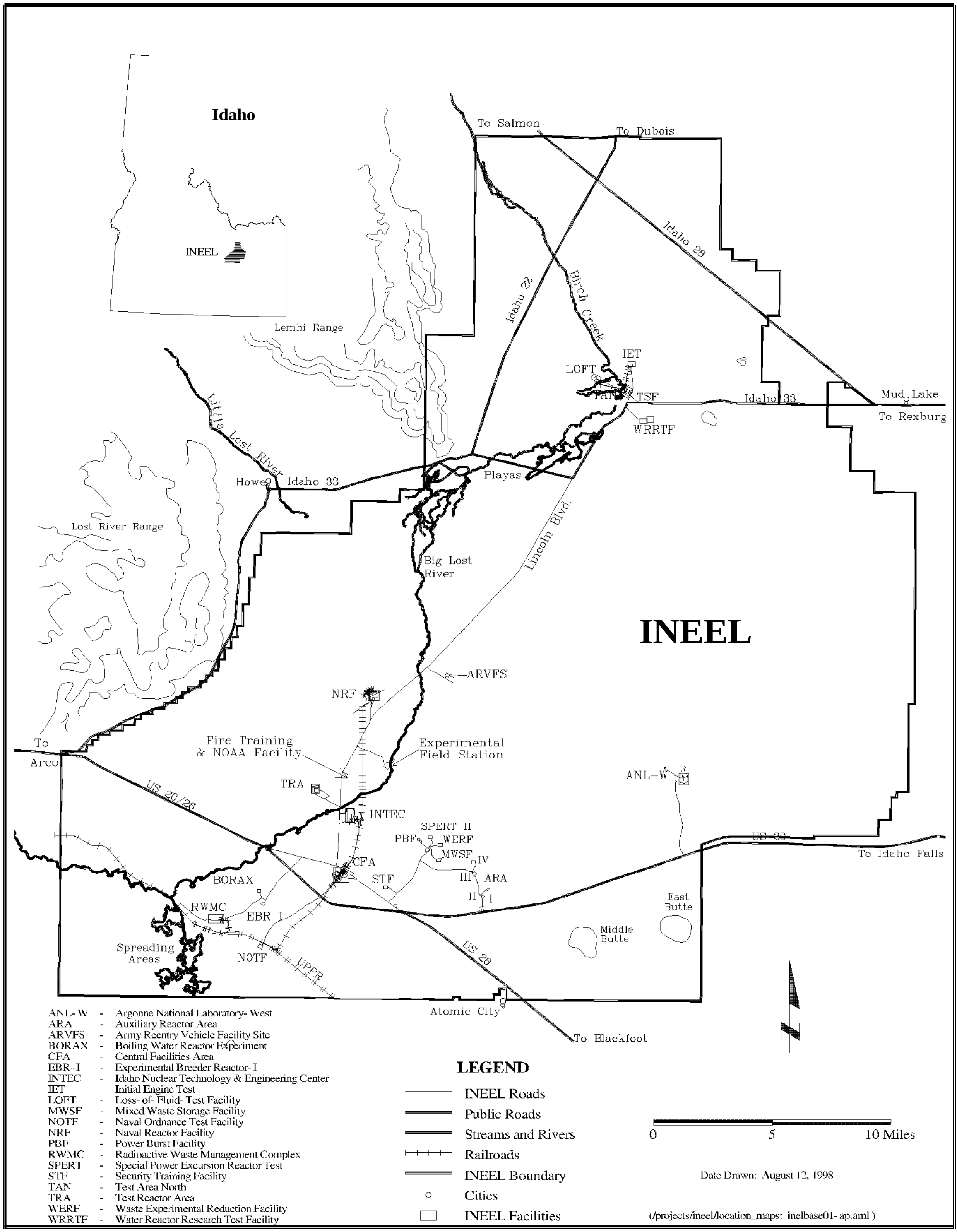


Figure 1-1. Map of the Idaho National Engineering and Environmental Laboratory showing the location of major facilities.

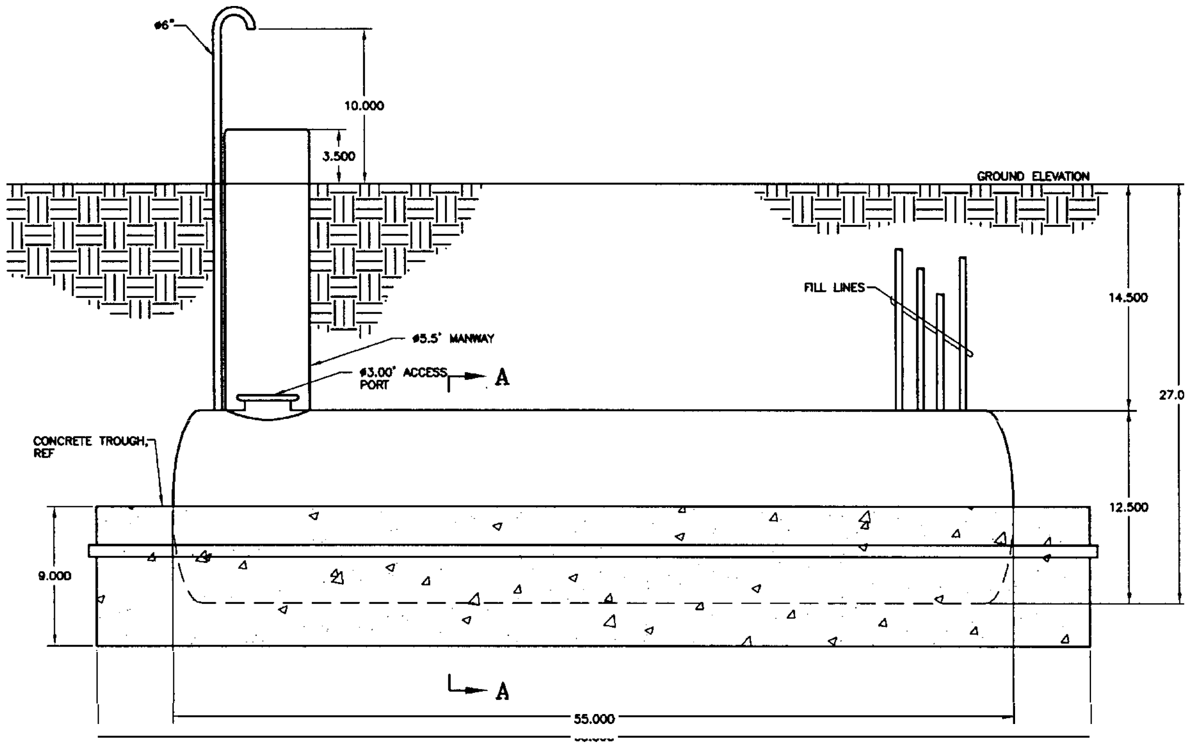
The TAN facility is located at the north end of the INEEL, approximately 43.5 km (27 mi) northeast of the Central Facilities Area (see Figure 1-1). In the 1950s, the United States Air Force and the Atomic Energy Commission Aircraft Nuclear Propulsion Program established TAN to support nuclear-powered aircraft research.

The material of concern resides in two underground tanks just east of the TAN groundwater treatment facility; the location is identified as the PM-2A tanks within the TSF-26 site. Each tank has a 50,000-gal capacity, was constructed of carbon steel, and measures 12.5 ft in diameter and 55 ft in length. They lie horizontally in concrete troughs, the bottoms of which are located 30 A underground. The top access ports on the tanks lie approximately 15 ft below ground (see Figure 1-2). A manned entry was considered, but radiological engineering measured exposure rates that were too significant to receive facility management approval. Therefore, cover material will be excavated from the tank tops and a trench box will be installed (refer to work package 69304) to accommodate drilling of sample access holes. Samples will be collected pending soil removal activities and trench box installation, which will provide access to tank sample points. .

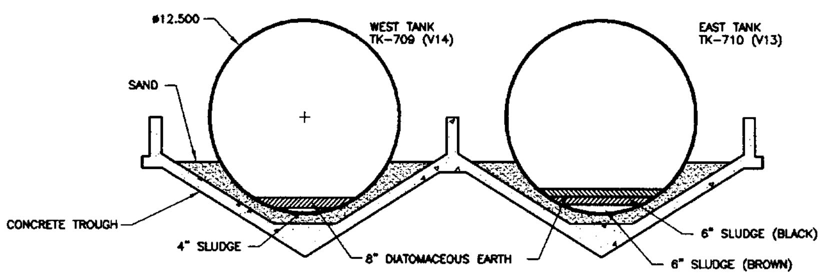
In April and September of 1996, attempts were made to sample Tanks V-13 and V-14. Tank V-13 was sampled during both efforts. In April 1996, samples were collected from Tank V-14 but were not analyzed because the samples were not representative of the sludge and liquid remaining in the tank. In September 1996, attempts to sample Tank V-14 were aborted due to the sampling device's inability to move within the tank.

Analytical data for radionuclides and metals (from five aliquots of two samples) were reported for the Tank V-13 April sampling event. Analytical data for radionuclides, total volatile organic compounds (VOCs), PCBs, total metals, total semivolatile organic compounds (SVOCs), anions, total carbon, total halides, pH, and density (from two aliquots of four samples) were reported for the Tank V-13 September sampling event. Results indicate that the types of contaminants present in Tank V-13 are similar to those in the TSF-09 V-Tanks; however, the Tank V-13 concentrations generally were lower than the TSF-09 tanks. The 1996 VOC, SVOC, and PCB analyses detected only three organic compounds in Tank V-13: (1) bis(2-ethylhexyl)phthalate, (2) Aroclor-1254, and (3) Aroclor-1260. The remaining organic compounds on the target compound lists received the "U" data (not detected) qualifier at very high detection levels. The detection limits for the VOC analyses were at 210 and 220 mg/kg, and the bis(2-ethylhexyl)phthalate was detected at 75 mgkg, with a "J" (estimated) data qualifier. Detection limits for PCBs varied from 1.4 to 3.9 mgkg. Aroclor-1254 was detected at 13 mgkg, and Aroclor-1260 was detected at 11 mgkg. Metals and radiological sampling data within the 1996 sampling effort indicated reasonable agreement among results for the different samples.

In summary, the detection limits of some characteristic organics, which were corrected numerically (division by 20) to estimate a toxicity characteristic leaching procedure (TCLP) concentration, exceeded regulatory levels that trigger classification of the tank contents as characteristically hazardous. Data for many other organic species that are governed by LDR universal treatment standards are at detection limits in excess of these treatment standards. It would be inappropriate to rely on these data to characterize or determine compliance status with treatment and disposal requirements. Other issues and uncertainties about the quality of these data include (1) the small number of samples taken, (2) variability of data, (3) methods for obtaining samples, (4) location where samples were obtained, and (5) method by which samples were analyzed.



a. Elevation: Looking West at **Tank** 710



Note: The sludge layers were measured before the diatomaceous earth was deposited.

b. **Section A–A: Looking** North

Figure 1-2. Views of Test Area North TSF-26 PM-2A tanks.

The PM-2A tank contents are RCRA-listed FOOl waste due to FOOl waste being fed to these tanks from the V-Tanks. The FOOl listing was a result of trichloroethene (TCE) being used in processes that eventually sent waste to these tanks. Process knowledge indicates that very little TCE should be expected in the tank contents. It is reasonable to assume that most of the TCE would have been evaporated when waste from the V-Tanks was evaporated before its movement to the PM-2A tanks. There is a reasonable likelihood that the concentration of TCE will be less than the 6-ppm LDR treatment standard. The same logic can be applied to other VOCs that might have been present.

The supposition made in the ***Final Record of Decision for Test Area North, Operable Unit 1-10*** (DOE-ID 1999), based on reasonable assumptions, inferences, and process knowledge, is that this waste will not require treatment. One of the purposes of this plan is to determine the validity of that assumption. This plan will determine if the waste exhibits a hazardous characteristic, meets appropriate treatment standards, and meets the applicable disposal facility's waste acceptance criteria. The PCBs have been identified as being present, but are not expected to drive the need for treatment or alternative treatment facilities. Additional information is provided in Appendix A (Table **A-1)** of the ***Data Quality Objectives Summary Report for the PM-2A Tanks (TSF-26)*** (Reese and Rodriguez 2000).

In April 1996, hand augers with extensions were used and sampling personnel were staged outside the access ports. Remote sampling proved difficult during the manipulation of tools to depth. These activities occurred from a depth of –25' atop the cover soils, which will be removed prior to the next sampling attempt. The log notes from 1996 indicate that organic Hnu readings taken on Tank V-13 were "no detects,'' and that there was buildup of diatomaceous earth directly underneath the sample port access, around which the tool had to be maneuvered. The highest sample bottle activity was recorded as 120 mr/hr betdgamma. Refer to Table 1-1 for past radiological data from Tank V-13; these data might not be representative of the radionuclides and their associated concentrations for the upcoming sampling event (Table 1-1), but might be indicative. Based on the information in Table 1-1, the waste is expected to be designated as Class B for disposal.

The Hnu readings at Tank V-14 also were "no detects." The activity on one Tank V-14 sample liner was 1.5 mr/hr beta/gamma. This reading is not considered accurate since the core contained only sand and none of the sludge of concern. Tank V-14 samples, which were collected using a robotic device in September 1996 and described as 50% sand and 50% sludge, exhibited radiological readings in the 50-60 mr/hr range. Personnel present during the 1996 sampling indicated that use of a hand-operated corer or auger would work with regard to the ability to collect samples to depth. If possible, a remote camera will be used to videotape the sampling activities.

Radiological information has been provided to the Packaging and Transportation (P&T) Department to determine packaging requirements. No separate gamma shipping screen unique to this sampling event before off-Site sample shipment is required as determined by P&T. In April 2003, a remote-controlled vehicle with a radiation-monitoring device was placed in the tanks to obtain better radiological dose information. Exposure rates were measured "waist-high" to provide general area whole body exposure rates. Exposure rates in Tank V-14 ranges from 70-280 mr/hr; exposure rates in Tank V-13 ranges from 260-400 mr/hr. The increasing activity from the manholes to the far ends of the tanks is attributed to the discharge point (fill lines) being on the far ends of the tanks. A video inspection was performed simultaneously.

The west **tank,** TIS-709 (V-14), contains approximately 8 in. of diatomaceous earth overlying an approximate 4-in. layer of sludge. The east **tank,** TIS-710 01-13), contains approximately 8 in. of diatomaceous earth overlying approximately 6 in. of black sludge and overlying approximately 6 in. of brown sludge. The sludge layers were measured before the diatomaceous earth was deposited. For an overall average of the waste stream, samples must account for all layers present. The video taken in April 2003 indicated that there are a few small, shallow pools of liquid in V-14. Project personnel presume that either the entry points have leaked or there was inadequate diatomaceous earth to absorb free liquids in their entirety. There is no evidence to suggest that any liquids present would pose a hazard that has not already been considered. The actual sampling is anticipated to take 2 to 3 working days.

Table 1-1. Classification of radiological waste in Tank V-13.

Radionuclide	Class A Limit (Ci/m³)	Class A Limit (nCi/g)	Class B Limit (Ci/m³)	Class B Limit (nCi/g)	Class C Limit (Ci/m³)	Class C Limit (nCi/g)	Average Concentration in Waste (Ci/m³)	Average Concentration in Waste (nCi/g)	Radiological Waste Classification'
C-14	8.0E-01	5.0–7.3 E+02[a]	NV	*Nv*	8.0E+00	5.0–7.3 E+03[a]	ND	ND	—
Tc-99	3.0E-01	1.9–2.7 E+02[a]	NV	*Nv*	3.0E+00	1.9–2.7 E+03[a]	ND	ND	—
1-129	8.0E-03	5.0–7.3 E+00[a]	NV	NV	8.0E-02	5.0–7.3 E+01[a]	ND	**ND**	—
Pu-241	3.9–5.6 E-01[a]	3.5E+02	NV	NV	3.9–5.6 E+00[a]	3.5E+03	**ND**	**ND**	—
Cm-242	2.2–3.2 E+00[a]	2.0E+03	NV	NV	2.2–3.2 E+01[a]	2.0E+04	1.7–2.4 E-06"	1.5E-03	A
Alpha transuranic with half-life >5 years	1.1–1.6 E-02"	1.0E+01	NV	NV	1.1–1.6 E-01[a]	1.0E+02	2.8–4.1 E-03"	2.6E+00	A
Pu-238	—	—	—	—	—	—	—	5.4E-01	—
Pu-239/-240	—	—	—	—	—	—	—	1.9E+00	—
Am-241	—	—	—	—	—	—	—	1.5E-01	—
Radionuclides with half-life <5 years	9.8 E-01[b]	7.0E+02	NV	NV	NV	NV	**ND**	**ND**	—
H-3	4.0E+01	2.5–3.6 E+04[a]	NV	*Nv*	NV	NV	**ND**	**ND**	—
Co-60	7.0E+02	5.0 E+05[b]	NV	NV	NV	NV	1.61 E-02[b]	1.1E+01	**A**
Ni-63	3.5E+00	2.2–3.2 E+03[a]	7.0E+01	4.4–6.4 E+04[a]	7.0E+02	4.4–6.4 E+05[a]	**ND**	**ND**	—
Sr-90	4.0E-02	2.9 E+01[b]	1.5E+02	1.1 E+05[b]	7.0E+03	5.0 E+06[b]	2.02 E+00[b]	1.44E+03	B
Cs-137	1.0E+00	7.1 E+02[b]	4.4E+01	3.1 E+04[b]	4.6E+03	3.3 E+06[b]	6.35 E-01[b]	4.5E+02	A

a. Radionuclide concentration ranges are calculated assuming a density range of 1.1–1.6 g/ml.
b. Radionuclide concentration is calculated with measured density of 1.4 g/ml.
c. See discussion in Section 1.2, "Site Description." The designation for disposal is anticipated to be Class B.
ND = no detect
NV = no value

1.3 Scope of Work

Sampling will be performed to obtain representative samples from the previously described tanks. A summary of the activities to occur follows:

- Obtain necessary prejob paperwork, including the final plan, radiological work permit, the project HASP, laboratory contracts, and the work package, which address all health and safety issues and mitigative actions
- Obtain the needed sampling tools and bottles
- Notify all parties involved/impacted by the sampling activity
- Conduct a prejob briefing
- Perform radiological and industrial safety surveys of the tank ports
- Complete chain of custody (COC) and logbook notes
- Conduct sampling activities in accordance with this document, the HASP, and the work package
- Perform decontamination of sampling task site, equipment, and personnel (as necessary)
- Prepare samples for storage and shipment, in conjunction with the P&T Department
- Ship samples to the analytical laboratory(ies)
- Store sample waste
- Track analytical data and validation
- Issue final characterization report.

2. PROJECT ORGANIZATION AND RESPONSIBILITIES

The "Quality Assurance Project Plan, Waste Generator Services Program Support Sampling and Analyses" (PLN-524) contains a description of the personnel associated with this characterization project. Table 2-1 contains specific personnel assignments not identified in PLN-524.

Table 2-1. Proposed personnel and job assignments.

Assignment[a]	Name
Project Manager	Jim Bruce
Job Site Supervisor/Field Team Leader	Jodie Landis, acting Field Team Leader and Prejob Briefer or project designee
WGS Facility Representative/Project Representative	Marshall Marlor/John Harris
Samplers, Plan Author, and WGS Sampling Point of Contact	Laura Davis, Donna Haney, Paul Waters, or other waste samplers (as necessary); Author and Point of Contact–Donna Haney
SAM Organization WGS Representative	Donna Kirchner
Packaging and Transportation	Lonney Nate

a. Health and safety issues will be addressed in the corresponding work packages and project-specific HASP.
HASP = Health and Safety Plan
SAM = Sampling and Analysis Management
WGS = Waste Generator Services

2.1 Project Manager

The project manager (work requestor) will ensure that all activities conducted during the project comply with INEEL MCPs and program requirement documents and all applicable requirements of the Occupational Safety and Health Administration, U.S. Environmental Protection Agency (EPA), DOE, U.S. Department of Transportation (DOT), and State of Idaho. The project manager coordinates all document preparation, field and laboratory activities, data evaluation, risk assessment, dose assessment, and design activities. The project manager is responsible for the overall work scope, schedule, and budget.

The project manager is responsible for field activities and for all personnel (including craft personnel) assigned to work at the project location. The project manager will serve as the interface between operations and project personnel and will work closely with the sampling team at the site to ensure that the objectives of the project are accomplished in a safe and efficient manner. The project manager will work with all other identified project personnel to accomplish day-to-day operations, will identify and obtain additional resources needed at the site, and will interact with environmental, safety, health, and quality assurance oversight personnel on matters pertaining to health and safety.

2.2 Job Site Supervisor/Field Team Leader

The field team leader (FTL) or job site supervisor (JSS) will be the INEEL representative at the site with responsibility for the safe and successful collection of samples. The FTL/JSS acts as the team leader and works with INEEL facility personnel; environmental, safety, health, and quality assurance personnel; and the field sampling team to manage field-sampling operations and to execute the characterization plan. The FTL/JSS enforces site control, documents activities, and may conduct the daily safety briefings at the start of the shift. Health and safety issues may be brought to the FTL's attention.

If the FTL/JSS leaves the site during sampling operations, an alternate will be appointed to act as the FTL/JSS. The identity of the acting FTL/JSS will be conveyed to sampling personnel at the sampling location, recorded in the logbook, and communicated to the facility representative (when appropriate).

2.3 Waste Generator Services Facility Representative/Project Representative

The WGS waste technical specialist will ensure that disposition of waste material complies with approved INEEL waste management procedures. The WGS personnel have the responsibility to help solve waste management issues at the task site. Personnel also prepare the appropriate documentation for waste disposal and make the proper notifications, as required. All waste will be disposed of using approved INEEL procedures.

2.4 Samplers/Plan Author and Sampling Point of Contact

Samplers include all task site personnel assigned to the characterization project that obtain samples for analytical purposes. All samplers including INEEL, DOE, and subcontractor personnel must understand and comply with the requirements of this document and other applicable documentation. The FTL/JSS will brief sampling personnel at the start of each shift on the tasks to be performed and the applicable health and safety requirements. Work tasks, associated hazards, engineering and administrative controls, required personal protective equipment (PPE), work control documents, and radiological and emergency conditions will be discussed during the prejob briefing.

Samplers are responsible for identifying any potentially unsafe situations or conditions to the FTL/JSS and applicable environmental, safety, health, and quality assurance representatives for corrective action. If it is perceived that an unsafe condition poses an imminent danger, sampling personnel are authorized to stop work immediately and notify the FTL/JSS of the unsafe condition.

2.5 Sampling and Analysis Management Technical Representative

The Sample and Analysis Management (SAM) (formerly the Sample Management Office) technical representative is responsible to help define the analytical project, generate the sampling and analysis plan table, and generate and issue sample labels. The SAM representative will determine which laboratory will provide analytical services, based on established policies and contracts, and will prepare the task order statement of work (TOS). The SAM representative also will track analytical progress and perform cursory review of the final data packages. In addition, the SAM representative will obtain independent validation of the data results as project requirements dictate.

2.6 Packaging and Transportation

The P&T representative at TAN has been provided with all pertinent information to make shipping determinations without a new shipping screen. Packaging and Transportation provides the shipping classification, the packaging and technical guidance, and scheduling support. Consideration must be given to the time needed to pull samples and get the shipment offsite, with regard to short holding times on some analyses. Refer to Table 4-1.

3. DATA QUALITY OBJECTIVES

This section summarizes pertinent information from PLN-524, "Quality Assurance Project Plan, Waste Generator Services Program Support Sampling and Analyses." For additional information, the actual Quality Assurance Project Plan should be referenced. Data quality objectives (DQOs) are qualitative and quantitative statements derived from the first six steps of the EPA's DQO process that:

- Clarify the study objective
- Define the most appropriate type of data to collect to meet project needs
- Determine the most appropriate conditions from which to collect the data
- Specify tolerable limits on decision errors, which will be used as a basis for establishing the quantity and quality of data needed for decision-making.

Sample data that sufficiently represent the contents of the PM-2A tanks are required for:

- WGS to perform a RCRA hazardous waste determination in accordance with 40 *Code* of *Federal Regulations* (CFR) 262.11, "Hazardous Waste Determination"
- WGS to determine if the contents of the PM-2A tanks meet the LDR specified in 40 CFR 268, "Land Disposal Restrictions," or to establish if treatment is required before the Operable Unit (OU) 1-10 Project performs the remedial actions (McDannel 2003)
- WGS to determine if the contents of the PM-2A tanks meet the waste acceptance criteria for disposal at the INEEL CERCLA Disposal Facility (ICDF) or Envirocare
- A treatment, storage, and disposal facility or OU 1-10 Project design personnel to understand the chemical, physical, and radiological characteristics of the contents in order to determine if the contents meet the waste acceptance criteria of the treatment, storage, and disposal facility or for the project personnel to design a process that will treat the contents (if necessary)
- OU 1-10 Project design personnel to understand the chemical, physical, and radiological characteristics of the contents in order to design content-removal strategies and equipment
- P&T personnel to understand the chemical, physical, and radiological characteristics of the contents in order to define appropriate packaging requirements for the contents and transport them in commerce in accordance with 49 CFR, "Transportation."

The DQOs are discussed in the context of the DQO process, as defined by EPA guidance (EPA 1994). The EPA developed this process to ensure that the type, quantity, and quality of data used in decision-malung are appropriate for the intended application. The DQO process includes seven steps, each of which has specific outputs. Each of the following subsections corresponds to a step in the DQO process, and the output for each step is provided (as appropriate).

3.1 Problem Statement

The first step in the DQO process is to clearly state the problem to be addressed. The intent of this step is to clearly define the problem so that the focus on the activities will be unambiguous. The appropriate outputs for this step are (1) a concise description of the problem, (2) a list of the planning team members, (3) identification of the decision-maker(s), and (4) a summary of available resources and relevant deadlines for the study.

The problem statement is that there is a need to (1) perform RCRA characterization of the TAN PM-2A tank contents, (2) provide radiological data for ICDF disposal and DOT shipping requirements, and (3) provide physical property data for solids-removal system design. Sampling is necessary to establish whether treatment is required before performing remedial actions and to determine acceptable disposal facilities (McDannel 2003).

3.2 Decision Statement

The second step in the DQO process is to identify the decisions and the potential actions that will be affected by the data collected. This is done by identifying principal study questions and alternative actions that could result from resolution of the principal study questions and by combining the principal study questions and alternative actions into decision statements. Waste characterization must be performed to complete both radioactive and hazardous waste determinations, to demonstrate that material meets or does not meet the LDR(s) and ICDF or Envirocare waste acceptance criteria, and if treatment is required.

One of the objectives of this characterization project is to answer the following questions:

- What are the shipping/packaging requirements?
- What are the concentrations of RCRA hazardous contaminants?
- What are the concentrations of radioactive hazardous contaminants?
- How do the physical property data apply to the solids-removal system design?
- How do all the data affect the disposal/treatment options?

The alternative actions to be taken, depending on resolution of the principal study question(s), are as follows:

- Will shipment and associated packaging be classified as nonradioactive, limited quantity, or radioactive?
- Will the concentrations of RCRA hazardous contaminants exceed regulatory levels?
- Will the concentrations of radioactive hazardous contaminants exceed the receiving disposal facility's waste acceptance criteria?
- Will physical property data result in changes to the solids-removal system strategy?
- Where can the tank contents be disposed of, and will the tank contents require treatment before disposal?

Combining the principal study question and alternative actions results in the following decision statement:

- Provide physical property data and determine the concentrations of both radioactive and hazardous contaminants for incorporation into the solids-removal system design, determine shipping/packaging requirements, determine if treatment is required to identify the appropriate disposal facility, and develop plans for appropriate management accordingly.

3.3 Decision Inputs

The third step in the DQO process is to identify the informational inputs required to resolve the decision statements and to determine which of those inputs require measurements.

Collection of physical data and hazardous constituent concentrations (including TCLP)—determined using analyses conducted in accordance with physical property, radiological, and RCRA analyses—must be obtained to resolve the decision statements.

Although heterogeneity is anticipated within the wastes due to the layering over time and addition of the diatomaceous earth, the process that generated the material in both tanks was the same. Both tanks' contents are considered one overall population; the intent is to establish the average for the population. With the process knowledge and no expected significant variation between tanks, 24 subsamples comprising eight overall composite sets, or data points, are considered statistically valid.

3.4 Study Boundaries

The fourth step in the DQO process is to define the spatial and temporal boundaries of the study. The spatial boundaries define the physical extent of the study area; they may be subdivided into specific areas of interest. The temporal boundaries define the duration of the entire study or specific parts of the study. Refer to PLN-524 for additional information. The appropriate outputs of this step are a detailed description of the spatial and temporal boundaries of the problem and a discussion of any practical constraints that might interfere with the study.

Since holes will be cut into the top of the tank at areas that are considered to be indicative of variation along the length of the tank, good vertical and spatial representation in samples is expected. There is neither any reason to suspect that any sample location identified for collection cannot be obtained, nor is there any reason to suspect that there will be inadequate volume available for all sample sets, including splits/duplicates.

The sample collection option that provides the most representative characterization of the sample population while adequately protecting the health and safety of the sampling team members will be chosen. Limitations on data interpretation introduced by sample collection constraints, if applicable, will be discussed in the project final report. The plan is to drill three holes at each sample location per tank. Engineering personnel will calculate (1) the angle at which the two side samples must be collected and (2) the overall volume expected to be yielded at each sample grid. Overall volume is needed to ensure minimum analytical quantities will be met and to ensure adequate tool liners are on hand for sampling activities.

3.5 Decision Rule

The fifth step in the DQO process is to (1) define the parameters of interest that characterize the population, (2) specify the action level, and **(3)** integrate previous DQO outputs into a single statement that defines the conditions that would cause the decision-maker to choose among alternative actions. Typically, the decision rule takes the form of one or more "If...then" statements describing the action or actions to take if one or more conditions are met. The decision rule must be specified in relation to a parameter that characterizes the population of interest.

The upper confidence limit (UCL) discussed in Section **3.6,** "Decision Error Limits," will be used to establish ICDF waste acceptance criteria for RCRA constituents.

3.6 Decision Error Limits

The sixth step in the DQO process is to minimize uncertainty in the data by specifying tolerable limits on decision errors. The limits are used to establish performance goals for the data collection design. The possible range for the parameter of interest is determined, and the types of decision errors and the potential consequences of the errors are defined. The decision-maker must define tolerable limits on the probability of malung a decision error. Additional information on decision errors is provided in PLN-524. Reliable information concerning the chemical properties of a solid waste is needed to compare those properties with applicable regulatory thresholds. These data are used to complete a hazardous waste determination and to determine if the tank contents meet LDRs. Sample support personnel use these data to prepare a final characterization report and calculate a result in compliance with RCRA SW-846, Chapter 9. The UCL calculated for organic/inorganic or classical chemistry tests is 80%. However, as stated in Chapter 9, Section 9.1.1.1 of SW-846, this is a two-sided UCL; therefore, the probability of exceeding the regulatory threshold is 10%, thereby resulting in a 90% confidence interval. This is the result used for comparison to the regulatory threshold. Historically, a confidence interval has not been reported with radiological results. Radiological results are reported with an uncertainty, representing the variability or inaccuracy associated with a measured value due to random fluctuations in the measurement process. The uncertainty is reported with an associated confidence level (one sigma).

The two types of decision error for waste material characterization are determining that the waste **does not** display contaminants above the disposing facility's waste acceptance criteria, when, in fact, it **does,** or determining that the waste materials **do** display regulated levels of contaminants above the disposing facility's waste acceptance criteria, when in fact they **do not.** The consequences of each decision error must be considered.

3.7 Design Optimization

The last step in the DQO process is design optimization. The purpose of design optimization is to identify the best sampling and analysis design that satisfies all of the previous steps in the process. The activities involved in design optimization include:

- Reviewing the outputs of the first six steps and existing data
- Developing general data collection design alternatives
- Formulating a mathematical expression needed to solve the design problem for each data collection design alternative
- Selecting the optimal number of samples to satisfy the DQOs for each data collection design alternative
- Selecting the most resource-effective data collection design that satisfies all the DQOs.

After these activities are completed, the operational details and theoretical assumption of the selected design are documented in the characterization plan.

The sample design chosen for the TAN PM-2A tanks is based on the approach that is thought to best represent both tanks' contents, resulting in an overall "average." The two tanks are considered one population. Refer to Section 4.1.6, "Sample Collection Procedures," of this plan. A 90% UCL is required for RCRA characterization and is discussed in detail in PLN-524.

4. SAMPLE COLLECTION, ANALYSIS, AND DATA MANAGEMENT

4.1 Sample Collection

4.1.1 Presampling Meeting

Before sampling takes place, project personnel will meet to ensure that sampling and analysis can be performed in a safe manner and will provide the project with usable data. Personnel at the meeting will ensure that all necessary equipment and documentation are present and that all personnel understand the project scope and objectives. This self-assessment will be noted in the sample logbook.

4.1.2 Sampling and Analysis Requirements

Table 4-1 summarizes the locations to be sampled and the analyses to be performed for this sampling activity. Each location selected for sampling will include samples for a regular set of analyses and one split/duplicate per tank for data comparability. A copy of this Field Sampling Plan has been provided to the **SAM** representative who coordinated the laboratories and sample numbers table (Appendix A) and associated labels. The laboratories must be Utah-certified.

Laboratory contracts specify how samples are to be handled. The Lexan liners will be capped in the field and shipped directly to BWXT who, in turn, will process samples and send at least the minimum volumes needed for other analyses to Sevem-Trent and SWRI within five working days. Sampling personnel will provide the labeled empty bottles for Severn-Trent and SWRI analyses to BWXT.

The P&T Department has confirmed adequate information exists for making a packaging and shipping determination without additional onsite gamma shipping screens.

Because interferences resulted in detection limits above regulatory levels during past sampling activities, the project is worlung closely with the SAM Program to try to ensure that, for this investigation, the laboratory(ies) will be able to mitigate/anticipate possible matrix interferences. Data are usable and defensible at the detection level (U code) so long as the data point is below the regulatory levels.

NOTE: *One location per tank for each analysis type in Table 4-1 (excluding bulk density and particle size analyses) includes splits/duplicates. The INEEL SAM Program is responsible for obtaining laboratory analytical services for the required analyses in accordance with MCP-9439, "Preparation for Environmental Sampling Activities at the INEEL." The SAM Program will prepare TOS documents, if needed, for laboratory services.*

Maximum sample holding times are listed in Table 4-1 and are defined from the date of sample collection to the date of sample preparation or analysis. Samplers will coordinate with the analytical laboratory to ensure that samples arrive at the laboratory in order to meet holding times. Sample preservation is conducted to ensure that target analytes do not escape from field samples or become chemically attached to sample containers before analysis. Typical sample preservation activities include the addition of acids or cooling the samples to a designated temperature. Applicable preservation requirements for this sampling activity are identified in Table 4-1.

Table 4-1. Summary of sampling collection for unspecified solids.

Location	Analysis Type/Code	Volume/Bottle Construction	Lab Name/Holding Time and Preservation
All grids – 8 samples	Total Organic Halides (WCH-A-040); ER-TOS-A2035	Min 10 grams – amber glass	Severn-Trent/28 days; 4 deg C
All grids, no duplicate – 6 samples	Particle Size (MIS-A-019); ER-TOS-S2076	Min 150 grams – 500 mL glass or plastic	SWRI/NA; 4 deg C
Grid 3 only – 2 samples	Bulk Density (MIS-A-061); ER-TOS-S2076	Min 150 grams – 500 mL glass or plastic	**SWRVNA;** 4 deg C
All grids – 8 samples	U-233, U-234, U-235, U-236, U-238 and Total Uranium; (MET-A-025): ER-TOS-S2076	Min 100 grams – 250 mL glass or plastic	SWRI/28 days; 4 deg C
All grids – 8 samples	Suite 1 Organics including codes: VOA-A-016; VOA-A-008; VOA-A-011; VOA-A-012; SVO-A-013; SVO-A-007; PEP-A-005; [HER-A-002; PEP-A-007; *SAP* Table gives specific analysis descriptions; ER-SOW-429	Min 335 grams – sent in Lexan liner	BWXT/7 days; 4 deg C
All grids – 8 samples	Suite 2 Radionuclides including codes: IASP-A-003; IASP-A-007; IASP-A-011; IASP-A-015; IASP-A-023; IASP-A-035; IGPC-A-002; ILSC-A-007; ILSC-A-010; IGAM-A-018; ILSC-A-004; IGAM-A-014, ILSC-A-013; ILSC-A-001; IGPC-A-007; IGAM-A-016; IGAM-A-006; *SAP* Table gives specific analysis descriptions; ER-SOW-429	Min 100 grams – sent in Lexan liner	BWXT/28 days; 4 deg C

Table 4-1. (continued).

Location	Analysis Type/Code	Volume/Bottle Construction	Lab Name/Holding Time and Preservation
All grids – 8 samples	Suite 3 Inorganics including codes: MET-A-031; MET-A-012; MET-A-016; MIS-A-004; MIS-A-006; MIS-A-007; SAP Table gives specific analysis descriptions; ER-SOW-429	Min of 160 grams – sent in Lexan liner	BWXT; 72 hours – 4 deg C

Notes:

The Toxicity Characteristic Leaching Procedure (TCLP) requires that material be particle size reduced to <9.5 mm; there is no reason to expect that sizing will be necessary due to the particle type and size for this multimedia waste stream.

The gamma isotopes to be reported include Am-241, Sb-125, Ce-144, Cs-134, Cs-137, Co-58, Co-60, Eu-152, Eu-154, Eu-155, Mn-54, Nb-95, Ra-226, Ru-103, Ru-106, Ag-108m, Ag-110, U-235, Zn-65, and Zr-95.

Note: The total volume required for minimum laboratory analyses are 1005 grams; the project manager has calculated that at least double the required minimum volume will be collected from both tanks (including material from three cores per location), so there should be no problem achieving required volumes.

The project manager is responsible for ensuring that a Document Action Request (DAR) (Form 412.11) is written and approved for any increase to the scope documented in this plan before sampling. The sampling FTL will ensure that any changes to this document regarding sampling frequency, location, or analysis are documented in the sample logbook.

A sampling logbook will be prepared containing a written record for all field data gathered, field observations, field equipment calibrations, samples collected for analysis, and sample custody. Field logbooks are legal documents and are maintained to ensure that field activities are documented properly as they relate to site safety meetings and that site work is conducted in accordance with the health and safety procedures. Field logbooks will be bound, and they will contain consecutively numbered pages. All entries in field logbooks will be made using permanent ink pens or markers. All mistakes made, as entries, will be amended by drawing a single line through the entry and then initialed and dated by the person making the correction, including an explanation of why original entry was in error.

4.1.3 Sampling Equipment and Documentation

The following equipment and supplies will be used for sampling (as needed):

- Long-handled spoon/scoops and compositing pans
- Soil corers, Lexan tube extensions and caps, hammer device
- PPE designated in the work package
- Monitoring equipment will be provided by project safety personnel—radiological, airborne
- Measuring scale
- COC forms
- Sample logbook—maintained by WGS
- FTL logbook—maintained by the Environmental Restoration (ER) Program (i.e., Document Control)
- Wipes/absorbent towels
- Bottles/labels
- Laboratory contracts
- Address labels
- Final plan
- Nonphosphate detergent
- Tap water
- Deionized water

- Simple Green® (nontoxic organic solvent approved by industrial hygienist)
- Blue ice
- Ice chest(s)
- Adhesive tape (clear, duct, and strapping)
- Liner bags, individual sample bags, and waste bags
- Aluminum foil
- Pens and markers
- Custody seals
- DOT packaging and paperwork-coordinated by project manager through Packaging and Transportation.

4.1.3.1 **Field Equipment *Calibration and* Setup.** Radiological Control personnel are responsible for calibrating all radiological monitoring equipment and placing and handling the telemetry dosimeters. The industrial hygienist will perform monitoring for confined space entry and will be responsible for measuring and evaluating other chemical hazards. Both a confined space entry permit and a radiological work permit will be required. Cognizant safety personnel will document all safety instrument calibrations in calibration logbooks. Any monitoring required by safety personnel will be documented in the work package.

4.1.4 Sample Designation and Labeling

Each sample bottle will contain a label identifying the field sample number, the analyses requested, the sample date and time, and the sampler's initials. Labels will be secured on the sample using clear plastic tape.

Uniqueness is required for maintaining consistency and preventing the same identification code from being assigned to more than one sample. A systematic character code will be used to uniquely identify all samples. The SAM Program will generate a sampling table, numbers, and labels that correlate directly to WGS projects (see Appendix A). The sample numbers are 10 digits following the format below:

- WGS—the first three digits indicate the program through which the work was requested.
- **105**—the next three digits are sequential numbers that are computer-generated by the SAM Program and indicate distinct locations.
- 01—these two digits indicate the first sample set collected at a given location; **02** indicates duplicate samples from the same location.
- **VB**—these two digits reflect the unique identifier for the sample analysis, in this case, "density."

4.1.5 Chain of Custody

The COC procedures will begin immediately after collecting the first sample. At the time of sample collection, the sampling team will initiate a COC form for each sample. Then, all samples collected will remain in a sampling team member's custody until the custody is transferred to the analytical laboratory's sample custodian. Upon receipt at the laboratory, the sample custodian will review the sample labels and the COC form to ensure completeness and accuracy. If discrepancies are noted during this review, immediate corrective action will be sought with the sampling team member(s) identified on the COC relinquishing custody. Pending successful corrective action, the laboratory sample custodian will sign and date the COC, signifying acceptance of delivery and custody of the samples. For more information, refer to MCP-9363, "Labeling Samples and Maintaining Chain of Custody."

4.1.6 Sample Collection Procedures

Sample collection will involve obtaining solids using the tool that will provide material most spatially and vertically representative of the media overall. Because the tank solids consist of multiple phases and variable distribution, the sample design will be based on a model that is appropriate for heterogeneous materials. The number of samples required for reliable sampling varies depending on the distribution of the waste. For these tanks, the waste components and their associated volumes are known. However, the design will account for potential stratification from an overall spatial perspective because contained waste has a much greater tendency to be non-randomly heterogeneous in a vertical rather than horizontal direction due to (1) settling of solids and (2) the variation in the waste contents as they enter the container (including changes in waste deposited from one year to another). The tanks are ribbed into four sections. Subdividing the tanks into distinct populations based on ribbing was discussed; however, using a statistically based systematic random approach will meet the same goal of representation reflecting material vertically and spatially over time.

Sampling accuracy can be achieved through a form of random sampling. In this case, where the project needs to determine levels of contamination over the length of each tank, a systematic random sampling design will be applied. A systematic random grid has a random starting point, but subsequent sampling locations are identified in a systematic manner. Because how well samplers can access grids from the trench box is unknown, the sample locations may have to be adjusted through engineering controls; this alteration is expected to yield the same results. For instance, drill holes may actually be within gnds that are close to but not exactly those identified due to the trench box configuration, but this will not impact DQOs.

It is understood that the most potentially contaminated "sludge" material will lie along the bottom center of the tanks due to configuration. Applying a grid down the centerline of each tank would be expected to bias the data high. Since the waste will be treated/disposed of "overall," the design should account for the material residing along the sides, which is predominantly diatomaceous earth, due to curvature of the tank. Since the overall volume is known and the volumes attributable to each type of material present are known, it would be possible to (1) sample only down the centerline and perform an engineering calculation to account for any biasing that might be introduced through exclusion of the "border" material or (2) to apply a systematic random approach that includes subsamples from the randomly selected center location in addition to subsamples from each side. Both approaches were discussed with project personnel, and it has been agreed that the second approach (to control heterogeneity and collect many random increments that will increase mass to reduce error) would provide the most defensible data without biasing the data high.

A 25-space grid was applied to each tank. A random numbers table was used to select the starting grid point of 3; the subsequent sample locations will be at 10-space increments. The beginning grid

(Location #3) falls at approximately the manway port end of the tanks. Based on the tank size of 55 ft long and 12.5 ft wide, each of the 25 gnds will be 2.2 ft in length; the width of material appeared to be consistent from entry to end of tanks (video). To account for uneven distribution without bias, this is the approach to follow:

1. As allowable based on physical restrictions (the positioning of the trench box), access the sample locations.

2. Based on engineering direction, holes will be drilled to account for all subsample locations—center and two-thirds point on each side of center to account for changes in deposition between the center point and sides of tank. This sample scheme is thought to present the most defensible approach to account for uneven distribution at each grid without introduction of high or low bias.

3. Core from top of material to the tank bottom at the center point. Retrieve the core and pull out the Lexan tub, capping and sealing both ends. Layer depths for each core will be recorded. Other identifiers with regard to consistency (e.g., hardness, brittleness, compactability, and moistness) will be communicated.

4. Reposition for access to the remaining locations for a given grid, collecting from the top of the material to the tank bottom. Retrieve the core and pull out the Lexan tub, capping and sealing both ends.

NOTE 1: *The intent must be to vertically/spatially represent the material existing at each sampling location for a total of three subsamples per grid (six subsamples for duplicate locations).*

NOTE 2: *Cores will be shipped intact offsite to BWXT for compositing/analyses under laboratory-controlled conditions. Refer to discussion in Section 4.1.2.*

NOTE 3: *While it is recognized that VOC samples typically are collected as grab samples with special care taken to minimize aeration, the project has determined that it will be acceptable to collect VOCs as composites to best meet the DQOs of this project. Considering that material will be removed through a highly volatile means—vacuum extraction—the sampling method itself will result in negligible impacts to any organics present. Collecting material as a composite with the other analyses will provide the most representative sample data. Grabbing VOCs from any one subsample location or phase of an identified grid would bias the data high or low.*

Apply the same strategy at Grid Locations 3, 13, and 23. Nine subsamples comprising three overall composites will be collected per tank (four overall composites (twelve subsamples) including split/duplicate sets per tank).

NOTE 1: *For each tank, the split/duplicates sample set will be collected on Grid Location 13 (see Appendix A).*

NOTE 2: *There are not expected to be any physical structures that would preclude sampling at any of the predetermined sample locations.*

On those grids requiring duplicate/splits: If volume from the original three cores per location yields adequate volume (as anticipated based on the project manager's volume estimates) for two sample sets, the material will be mixed as a split. The split sample should be collected from the same material as the original samples. If separate cores are used for the second sample set at Grids 13, then the material will be a duplicate, Whichever approach is used will meet DQOs and will be documented in the sample logbook.

Systematic Sampling Design.

NOTE: ********* = *signifies a sample location (refer to the discussion in Section 4.1.6, fourth paragraph). The grid will begin on the manway entry end of each tank.*

1
******3*****(starts at 4.4 to 6.6 ft)**
4
5
6
7
8
9
10
12
******13******(from 26.4 to 28.8 ft)**
14
15
16
17
18
19
20
21
22
******23******(from 48.8 to 51 ft)**
24
25

To summarize, this job will be performed as follows:

1. Attend a prejob briefing given by the facility/project representative. The prejob briefing will include a review of this Field Sampling Plan and the corresponding project-specific HASP and work package that will provide all hazards and associated mitigations. The person presenting the prejob briefing is responsible for ensuring that all the appropriate parties are invited and attend the prejob briefing and that training certifications are current for those performing work. Notifications will include Radiological Control Department, industrial hygienist, facility supervisor, laboratory contacts, Safety Department, and P&T Department.

2. Project manager must ensure that the job is on the plan of the day and that support personnel have been scheduled.

3. Review the appropriate guide for the tool(s) of choice before sampling. For example: Guide (GDE) -153 "Collecting Samples Using a Hand Corer"; and GDE-155, "Collecting Samples Using Scoops, Spoons, and Shovels."

4. Radiological Control and Safety personnel will perform any monitoring called out in work control documents.

5. Stage equipment as applicable to each sample location.

6. Don the required PPE defined in the work package.

7. Enter the trench box under direction of Safety personnel.

8. Assemble tool for insertion into tank contents.

9. Insert the tool through the access point and retrieve material from surface to depth at center and at the two-thirds points drilled on each side of center at each grid. Repeat for the duplicate sample unless adequate volume for splits as discussed in previous text.

10. Log physical description of contents.

11. Go through the sample process detailed above.

12. **A** separate set of tools per grid location may be used to maximize time and preclude decontamination.

    NOTE: *It is not anticipated that the Radiological Control Department will release* ***tools*** *as "clean," in which case the tools will be disposed and left at thefacility* ***for*** *proper storage/disposal.*

13. Accumulate waste and package in accordance with WGS and Radiological Control's instructions.

14. Doff PPE under direction of Radiological Control.

15. Remove samples from the area under direction of Radiological Control.

16. Repeat the process for the second tank.

17. Consult with the P&T Department, complete required paperwork, and package and transport samples accordingly. Samples will require radioactive shipment.

18. Move waste to an approved waste storage area.

A physical description will be made in the sample logbook and should include the following (if possible): radiation levels on samples how material was actually sampled (tools), physical consistency, any discrepancies from the description in this plan regarding the actual phases present, presence of moisture, physical limitations, and if any sample set is not considered representative, discuss why.

4.1.7 Equipment Decontamination Procedures

Any tool or equipment that contacts sample material will be decontaminated before use. Post-decontamination may or may not occur depending on the tool used, radiological controls, and whether the equipment becomes heavily contaminated with material. Any tool/equipment must be handled as potentially mixed waste and stored accordingly by the WGS facility representative along with other sample-generated waste. Refer to Section 4.1.9, "Waste Management." The following steps describe the decontamination process for tools or equipment that come into contact with sample material:

1. Spray with tap or distilled/deionized water and wipe
2. Spray with Simple Green® (nontoxic organic degreaser) and wipe
3. Spray with distilled/deionized water and wipe
4. Spray with soapy distilleddeionized water and wipe
5. Spray with distilled/deionized water and wipe
6. Air dry
7. Wrap any decontaminated equipment/tools in foil and secure with a custody seal.

Waste from decontamination procedures will be handled as described in Section 4.1.9.

4.1.8 Sample Transport

Samples will require radiological shipment and must be coordinated through the P&T Department. The P&T Department has confirmed there is adequate information on hand to classify samples for shipment. The P&T Department requires 24-hour prior notification. Prepare samples for shipment or storage and complete the applicable shipping papers. Deliver the coolers to the shipping authority for transport. Refer to MCP-9364, "Handling, Storing, and Shipping Samples."

4.1.9 Waste Management

Waste generated during the characterization project will include sampling equipment (e.g., wipes, aluminum pans, possibly tools, and PPE). It is not expected that any unaltered sample residuals will be returned from the laboratory. These articles will be handled, characterized, and disposed of in accordance with the *Waste Management Plan for the Test Area North, Operable Unit 1-10 Group I Sites Remedial Action* (INEEL 2003b). Personnel from WGS will coordinate waste disposal activities in accordance with INEEL procedures. Waste will be bagged, placed in containers, labeled, and stored in an approved waste storage area. The project manager, with assistance from WGS, will prepare waste determination and disposition forms for determining the disposition routes for all waste generated in compliance with the Waste Management Plan (INEEL 2003b).

The analytical laboratory will dispose of samples submitted to them for analyses or return them to the requestor, as stated in the applicable TOS(s). Coolers or other packaging, including ice, must be returned to the project. Samples returned from the laboratory will be accepted only if the original label is intact and legible; coolers must be clean and empty. If the samples are returned, the project manager is responsible to properly disposition the sample with the assistance of WGS personnel. All waste must be characterized and WGS personnel must pre-approve disposal.

4.2 Sample Analysis

Sample analyses will be performed by Utah-certified laboratories, which have been approved by the INEEL SAM Program. These laboratories will analyze the samples in accordance with project requirements, including:

- ER-SOW-394, "Idaho National Engineering and Environmental Laboratory Sample and Analysis Management Statement of Work for Analytical Services."

Project-specific requests for analysis forms or TOS(s) identify additional requirements for laboratory analysis. The following sections identify analysis requirements for the characterization project.

4.2.1 Analytical Methods

To ensure that data of acceptable quality are obtained from the characterization project, standard EPA laboratory methods or technically appropriate methods for analytical determinations will be used to obtain sample data. Analytical methods to be used for this characterization activity are identified in Table 4-2.

Table 4-2. Proposed analytical method and method descriptions.

Analytical Method	Method Description
1311/SW-846	TCLP metals = TCLP TAL plus copper and zinc
SW-846	Total metals (TCLP TAL) = TCLP TAL plus copper and zinc
1311/8260B	TCLP VOCs
8260B	VOCs (CLP TAL), includes carbon disulfide; VOCs (TAL) = 1, 4-dioxane
1311/8270C	TCLP SVOCs
8270C	SVOCs (CLP TAL)
TBD	Bulk density (only on specified gnds)
ASTM D421-85	Particle size (only on specified grids)
8082	PCBs
9045C	Hydrogen ion (pH)
9010B/9014	Reactivity (cyanide/sulfide)
9020B	TOX
1311/8081A	TCLP pesticides
1311/8151A	TCLP herbicides
Laboratory procedures	Radionuclides listed in Table 4-1 and the SAP Table

ASTM = American Society for Testing and Materials
CLP = Contract Laboratory Program
PCB = polychlorinated biphenyl
SVOC = semivolatile organic compound
TAL = target analyte list
TBD = to be determined
TCLP = toxicity characteristic leaching procedure
VOC = volatile organic compound

Any deviations from this information will be fully documented. Typically, the laboratory contact notifies the SAM Program of any deviations or problems. The SAM contact will provide the information to the project manager who will make a determination as to whether the laboratory will be instructed to continue the analytical work.

4.2.2 Instrument Calibration Procedures

Laboratory instrumentation will be calibrated in accordance with each of the specified analytical methods. The laboratory quality assurance plan shall include requirements for calibrations when specifications are not listed in analytical methods. Calibrations that typically are not called out in analytical methods include ancillary laboratory equipment and verification of reference standards used for calibration and standard preparation. Laboratory documentation will include calibration techniques and sequential calibration actions, performance tolerances provided by the specific analytical method, and calibrations dates and frequency. All analytical methods have specifications for equipment checks and instrument calibrations. The laboratory will comply with all method-specific calibration requirements for all requested parameters. If a failure of instrument calibration or equipment is detected, the instrument will be re-calibrated, and all affected samples will be analyzed using an acceptable calibration.

4.2.3 Laboratory Records

Laboratory records are required to document all activities involved in sample receipt, processing, analysis, and data reporting. The SAM Program records document sample receipt, handling and storage, and the sample analysis schedule. The records verify that the COC and proper preservation were maintained, reflect any anomalies in the samples, note proper log-in of samples into the laboratory, and address procedures used to prioritize received samples to ensure that the holding time requirements are met. Laboratory records are available upon request and should be coordinated through the SAM representative.

The laboratory is responsible for maintaining documentation demonstrating laboratory proficiency with each method, as prescribed in standard operating procedures. Laboratory documentation will include sample preparation and analysis details, instrument standardization, detection and reporting limits, and test-specific quality control criteria. Any deviations from prescribed methods must be recorded properly. Quality assurance/quality control reports will include general quality control records, such as analyst training, instrument calibration, routine monitoring of analytical performance, and calibration verification. Project-specific information (such as blanks, spikes, calibration check samples, replicates, and splits performed in accordance with project requirements) may be performed and documented. Specific requirements for the quantity and types of quality assurance/quality control monitoring and associated reporting formats will be specified in the task-specific laboratory statement of work.

4.3 Data Management and Document Control

4.3.1 Data Reporting

Standard plus raw data and 35-day data packages will be required for all data reported for this characterization project. Note that BWXT must process and ship to Severn-Trent and SWRI within five days of receipt of samples from BBWI. Severn-Trent and SWRI 35-day turnaround does not begin until samples are received from BWXT. **A** copy of the unvalidated data should be provided to the project manager immediately upon receipt. The final data package documentation will conform to the criteria specified in the following references:

- ER-SOW-394, “Idaho National Engineering and Environmental Laboratory Sample and Analysis Management Statement of Work for Analytical Services.”

The ER Statement of Work (SOW) prepared by the INEEL SAM Program is the standard means by which analytical data deliverable requirements are defined by INEEL projects to laboratories used by the INEEL. All laboratories used by this project will adhere to the documents used to establish technical and reporting standards.

4.3.2 Data Validation

Analytical data validation is the comparison of analytical results versus the requirements established by the analytical method. Validation involves evaluation of all sample-specific information generated from sample collection to the receipt of the final data package. Data validation is used to determine whether analytical data are technically and legally defensible and reliable. The final product of the validation process is the validation report. The validation report communicates the quality and usability of the data to the decision-makers.

All data generated for this project will undergo independent validation. The INEEL SAM Program will arrange for "rush" validation at the project's request. Level B validation is requested for all sample data reports generated during this project. The validation report will contain an itemized discussion of the validation process and results. Copies of the data forms annotated for qualification will be attached to the report.

Level B analytical method data validation includes all requirements for a cursory review, as well as a chemist's review of the data. The review will include verifying the appropriateness of reported analysis detection limits (radiological data) and reviewing instrument calibration, gas chromatograph/mass spectrometer instrument performance checks, lab control sample recoveries (radiological data), method blank contamination, matrix spikes/matrix spike duplicates recoveries/precision, laboratory duplicate sample precision, surrogate spike recoveries, internal standards (organic gas chromatograph/mass spectrometer methods), laboratory control samples (inorganic methods), and any other method-specific quality control criteria. The results of the review will be described in a limitations and validation report. Any suggested corrective actions for the laboratory and limitations on the data usability are included in the report.

4.3.3 Data Quality Assessment

The data quality assessment process is used to determine whether the data meet the project DQOs. Additional steps of the data quality assessment process might involve data plotting, testing for outlying data points, and other statistical analysis relative to the characterization project DQOs.

Data precision, accuracy, representativeness, reproducibility, and completeness are addressed in PLN-524. The completeness of the data is the number of samples collected and analyzed compared to the number of samples planned.

4.3.4 Final Characterization Report

A final characterization report will be prepared for this project in accordance with applicable program requirements; Laura Davis (526-5580) is the WGS point of contact for review of data and issuance of the final characterization report summarizing the sampling activity and the findings. The final report will contain a summary of all of the sample data generated during this sampling effort, the limitations and validation report, the log notes, the pertinent notes to the file, the COC forms, and the final Field Sampling Plan. The final report also will describe the sample collection effort. **A** description of the data quality assessment process also may be included. The final report will discuss how the data will be used. The DQO will be reviewed and evaluated to determine if the characterization project objectives were met.

4.3.5 Document Control

Refer to MCP-9362 and MCP-9363, "Waste Generator Services Logkeeping Practices," and "Labeling Samples and Maintaining Chain of Custody," respectively. Document control consists of the clear identification of all project-specific documents in an orderly form, secure storage of all project information, and controlled distribution of all project information. Document control ensures that controlled documents of all types related to the project will receive appropriate levels of review, comment, and revision (as necessary). The project manager is responsible for properly maintaining project documents according to **INEEL** document control requirements. Upon completion of the characterization project, all project documentation and information will be transferred to compliant storage according to project, program, and company requirements. This information may include field logbooks, COC forms, laboratory data reports, engineering calculations and drawings, and final technical reports.

5. HEALTH AND SAFETY REQUIREMENTS

In accordance with the requirements of MCP-3562, "Hazard Identification, Analysis, and Control of Operational Activities,'' a hazard-screening checklist has been completed for this characterization activity to identify all hazards associated with this project. Hazards identified on the checklist along with corresponding mitigation requirements were included in the work package or project-specific HASP. None of the health and safety issues are covered in this plan. The WGS sampling personnel will review and approve the work package to ensure that all hazards associated with sampling are identified and adequately mitigated. Sampling personnel must abide by all the health and safety requirements outlined in the work package.

6. REFERENCES

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MCP-9363, 2003, "Labeling Samples and Maintaining Chain of Custody," Revision 3, *Waste Generator Services Sampling Handbook,* April 2003.

MCP-9364, 2003, "Handling, Storing, and Shipping Samples," Revision 3, *Waste Generator Services Sampling Handbook,* April 2003.

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Appendix A

Sampling and Analysis Plan Table

Sampling and Analysis Plan Table for Chemical and Radiological Analysis

Plan Table Number WGS-006-03

SAP Number

Date 08/07/2003 Plan Table Revision 1.0 Project WAG1 GROUP 3 TANK CONTENTS PM-2A TANKS, V13 AND V14 Project Manager BRUCE, J E SMO Contact KIRCHNER, D R

Sample Description						Sample Location				Enter Analysis Types (AT) and Quantity Requested																			
Sampling Activity	Sample Type	Sample Matrix	Coll Type	Sampling Method	Planned Date	Area	Type of Location	Location	Depth (ft)	AT1 3A	AT2 9A	AT3 1G	AT4 VB	AT5 PA	AT6 T1	AT7 R9	AT8	AT9	AT10	AT11	AT12	AT13	AT14	AT15	AT16	AT17	AT18	AT19	AT20
WGS105	REG	SOLIDWASTE	CORE		8/11/2003	TSF-26	TANK 710 (V13)	PM-2A, GRID 3	NA	1	1	1	1	1	1	1													
WGS106	REG	SOLIDWASTE	SPLT		8/11/2003	TSF-26	TANK 710 (V13)	PM-2A, GRID 13	NA	2	2	2		1	2	2													
WGS107	REG	SOLIDWASTE	CORE		8/11/2003	TSF-26	TANK 710 (V13)	PM-2A, GRID 23	NA	1	1	1		1	1	1													
WGS108	REG	SOLID WASTE	CORE		8/11/2003	TSF-26	TANK 709 (V14)	PM-2A, GRID 3	NA	1	1	1	1	1	1	1													
WGS109	REG	SOLID WASTE	SPLT		8/11/2003	TSF-26	TANK 709 (V14)	PM-2A, GRID 13	NA	2	2	2		1	2	2													
WGS110	REG	SOLIDWASTE	CORE		8/11/2003	TSF-26	TANK 709 (V14)	PM-2A, GRID 23	NA	1	1	1		1	1	1													

The sampling activity displayed on this table represents the first 6 to 9 characters of the sample identification number. The complete sample identification number will appear on the sample labels

AT1 Analysis Suite #1
AT2 Analysis Suite #2
AT3 Analysis Suite #3
AT4 Density
AT5 Particle Sue
AT6 TOX
AT7 U-Iso
AT8
AT9:
AT10

AT11
AT12
A113
A114
A115
A116
AT17
AT18
AT19
AT20

Comments:
TCLP Metals = TCLP TAL plus copper and zinc
Total Metals(TCLP TAL) = TCLP TAL plus copper and zinc

U-Isotopes = U-233, U-234, U-235, U-236, U-238, Total Uranium
Pu-Isotopes = Pu-238, 239/240, 241, 242
Cm-Isotopes = Cu-242,2431244

Density = Bulk Density

VOCs (TAL) = 1,4 Dioxane

VOC (CLP TAL) includes carbon disulfide

Analysis Suites

Contingencies

Analysis Suite #1: SVOCs (CLP TAL), PCBs, TCLP Pesticides, TCLP SVOCs TCLP Herbicides, TCLP VOCs, VOCs (TAL), VOCs (CLPTAL)
Analysis Suite #2: Am-243, Cm-Iso, Am-241, C-14, Tc-99, Fe-55 (Rad Analysis), Gross Alpha, Ni-59, Ni-63, Np-237, Gamma Spec, Pu-Iso, Tritium, Sr-90, Iodine-12[illegible]
Analysis Suite #3: Total Metals (TCLP TAL), Hydrogen Ion (pH), Reactivity (Cyanide), Reactivity (Sulfide), TCLP Metals

Appendix B

Comments from the U.S. Environmental Protection Agency, Idaho Department of Environmental Quality, and the Department of Energy

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Idaho National Engineering & Environmental Laboratory

PROJECT DOCUMENT REVIEW RECORD

DOCUMENT TITLE/DESCRIPTION: Sampling and Analysis Plan Test Area North TSF-26, Inside the PM-2A Tanks (V13 and V14) WGS-006-03

DATE: 4/8/03 **REVIEWER:** **Donna Haney, plan author, response to EPA comments**

ITEM NUMBER	SECTION NUMBER	PAGE NUMBER	COMMENT	RESOLUTION
GENERAL COMMENTS				
1	Section 1, 1st para	1	This paragraph discusses the fact that the V-tanks continued to receive waste until 1982 and 1985. It is not clear what this has to do with the background of the PM-2A tanks. EPA recommends dropping the sentence.	The sentence will be removed.
2	Figure 1	2	It is not clear where the boundary of the INEEL is in the NE comer of the map (where Idaho 33 and arrow to Rexburg is.) Please review and correct if necessary.	Will review and correct if necessary.
3	1st para, 1st sentence	4	EPA suggests rewriting this sentence to read; “The assumption made in the Final ROD ….. 1999), based on reasonable assumptions, inferences, and process knowledge, is that this waste will not require treatment.”	The sentence will be rewritten as noted.
SPECIFIC COMMENTS				
1	Section 4.1.2, 1st para	14	It is not clear why the lab chosen to perform the analysis of the samples has to be “Utah” certified. Please provide some justification of why this is necessary. Can a lab in a different state be used? The phase “Utah-certified” is used elsewhere (see Section 4.2) and the text of the FSP may need to be revised.	No change. The project requested that the laboratory performing analyses be “Utah-certified” in the event that Envirocare is the disposing facility (although not anticipated). The intent was to ensure that any potential disposal option is addressed by the analyses in the plan to avoid resampling and not meeting DQOs. “Utah-certified” does not mean that the lab has to be in the State of Utah, just that the lab is certified to provide analytical data for wastes going to Envirocare.

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DATE: 4/8/03 **REVIEWER:** **Donna Haney, plan author, response to EPA comments**

ITEM NUMBER	SECTION NUMBER	PAGE NUMBER	COMMENT	RESOLUTION
2	Section 4.1.6, 1st full para	19	First EPA questions the use of "grid" vs. "row." Grid implies some vertical or y axis. The text indicates, and is supported by the figure on the next page, that the sampling is being done along 5 equally spaced rows. Also, it is not clear what purpose the use of a random numbers table to select the starting point for sampling. One could just as easily make the case that sampling next to the tank ends is not preferred and that the sampling locations were moved in an equal distance from the walls and then the distance between these end points was divided equally to locate the additional three sampling locations. This sampling grid does not appear to be very random.	No change. Section 9 of EPA's SW-846 "Test Methods for Evaluating Solid Waste" specifically refers to the systematic random sampling approach sections as "grids" when a random numbers table is used. The rows are evenly spaced because that is how systematic random sampling designs are applied to waste which may exhibit variation from the "random" starting point to the end of the area of concern. The starting grid was chosen from a random numbers table. Systematic random sampling is an EPA-approved type of probability sampling in which the first unit to be collected from a population is randomly selected, but all subsequent units are taken at fixed space intervals. We considered this more defensible and precise than simple random sampling since sample locations are distributed more evenly over the population. Systematic random allows coverage of the tanks from end to end and is defensible as the contents are essentially random or contain, at most, modest stratification.
3	Section 4.1.6, Item 7	20	This sentence discusses collecting split samples. Are these samples the same as the duplicate samples noted in the Sept. 02 QAPjP? That document also notes the need for field blanks for radionuclides soils samples and the need to collect equipment rinsate samples (see Section 4.1.7). Is such sample collection anticipated? If so, it should be noted in this document. lso, Section 6, References, should include the most recent version of the QAPjP.	No change. PLN-524, Section 1.5.1.1.2 states that either a duplicate or split can be used to measure field precision. We chose splits to minimize exposure time. No field blanks or rinsates are planned. PLN-524, Table 5 recommends field blanks only for subsurface soil samples. We aren't planning on decontamination of equipment due to the need to minimize time and the anticipated rad levels. All equipment will be bagged as waste. The most recent version of PLN-524 will be noted in the References section.

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DATE: 4/8/03 **REVIEWER:** **Donna Haney, plan author, response to IDEQ comments**

ITEM NUMBER	SECTION NUMBER	PAGE NUMBER	COMMENT	RESOLUTION
GENERAL COMMENTS				
1	Section 4		Photographs and/or video may be helpful in evaluating and documenting the sampling. If a visual documentation of the event is decided to be useful, it can be included in Section 4 of the document.	Agree. A video inspection is planned.
2			Once a work activity begins, there should be an inspection of work in progress to catch any shortcomings while they are still easy to correct. The field screening techniques for this project are iterative, and involve thorough evaluation at each step. Evaluation of completeness of work and contract compliance is an ongoing process and should be performed by the Site Supervisor during all site activities as well as the end of each phase.	Agree.

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DATE: **4/8/03** **REVIEWER:** **Donna Haney, plan author, response to IDEQ comments**

ITEM NUMBER	SECTION NUMBER	PAGE NUMBER	COMMENT	RESOLUTION
3	Section4.1.6		Problems can be encountered with sampling, analytical results and data interpretation. The document does list some potential problems along with proposed corrective actions (i.e. physical structures in the way, such as piping, and moving the grid to the next available sampling location) – from the notes in Section 4.1.6. It would be helpful if a table is created listing potential problems along with the proposed corrective actions that can be taken. This would greatly assist the field effort in collecting samples according to the plan. Some flexibility should also be introduced to allow certain actions, so the field team can make decisions based on current conditions that could potentially improve the sampling process.	No change. Agencies agreed to this action on a conference call.
SPECIFIC COMMENTS				
1	Section 1.2, 3rd para	3	Briefly describe why the samples collected in April 1996 from Tank V-14 were not representative of the sludge and liquid remaining in the tank.	In paragraphs 9 and 10 of the same section, additional detail is given as to why the April 1996 sampling is not considered representative.
2	Section 4.1.3, last bullet	17	The names of individuals should only be included in Table 2. In the document the person should be referred to by their role in the project. This would be helpful in case a person in not available for some reason, an alternate could assume the duties and the document would be unaffected. The individual named Lonney Nate should be included in Table 2, and referred to in the document by his respective role in the project.	Change will be incorporated.

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DATE: **4/8/03** **REVIEWER:** **Donna Haney, plan author, response to IDEQ comments**

ITEM NUMBER	SECTION NUMBER	PAGE NUMBER	COMMENT	RESOLUTION
3	Section 4.1.6, 2nd para, 2nd sentence	18	"Systemic" should be changed to "systematic"	Change will be incorporated.

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DOCUMENT TITLE/DESCRIPTION: Sampling and Analysis Plan Test Area North TSF-26, Inside the PM-2A Tanks (V13 and V14) WGS-006-03

DATE: 4/8/03 **REVIEWER:** **Donna Haney, plan author, response to DOE comments**

ITEM NUMBER	SECTION NUMBER	PAGE NUMBER	COMMENT	RESOLUTION
GENERAL COMMENTS				
1	Appendix A		Due to current rad level conditions inside the PM-2A Tanks and the resulting stay time limits for personnel taking the samples, the number of samples need to be reduced, provided they are still statistically valid.	With the present process knowledge and no anticipated variation between the tanks, there are 24 subsamples comprising eight overall composite sets or data points. Based on the tanks having received the same waste, and the fact that all material in both tanks defines one population, the decreased number of samples is still statistically valid. The FSP will be revised to incorporate the reduced sampling with 3 locations in each tank and 3 samples at each location, plus a duplicate. The 3 samples from each location will be composited.